

maximum velocity, thirty-two miles per hour from the northwest, at 10.20 p. m. Light rain fell from 6.30 to 7.10 p. m.

X.—Number x was observed in northern Montana on the morning of the 19th; it passed southeastward, following the general course of the preceding storm; the southeasterly movement ended in southern Dakota and the storm passed over the upper lake region on the 22d, developing considerable energy when central near Mackinaw City, Michigan, where the barometer fell to 29.01 on the afternoon of the 20th. It moved northeastward over the Saint Lawrence Valley, causing gales at extreme northeastern stations on the 21st. The central area became greatly extended as it moved to the northeast, but the wind increased in force and the most severe gales reported during the month occurred along the Atlantic coast as this storm passed over that region.

The following notes by Signal Service observers are of interest:

Buffalo, New York: a southwesterly gale set in at 7.30 a. m. of the 20th and continued until 6 a. m. of the 21st; at 9.10 a. m. it reached a velocity of fifty-eight miles per hour. During the storm the ice on the lake was broken up for a distance of about ten miles out, which is a very unusual occurrence for this season.

Mackinaw City, Michigan: a southerly gale, shifting to the southwest, began at 1.45 a. m. of the 20th; during the afternoon the wind shifted to the west, and attained a velocity of thirty-six miles per hour at 7.45 p. m. The barometer fell rapidly until 1.30 p. m. when it stood at 28.97, after 1.80 p. m. it began rising rapidly.

Cairo, Illinois: during the 20th high variable winds prevailed, maximum velocity forty-four miles per hour from the southwest. River men state that this was the strongest wind that has occurred on the river for many years; several barges were torn from their moorings and blown across the river.

XI.—This storm appeared on the north Pacific coast on the afternoon of the 20th, and crossed the continent to the Nova Scotia coast, it being clearly defined and the centre approximately located at each of the tri-daily reports from the date of its appearance until the 10 p. m. report of the 24th, when the centre was located near Eastport, Maine. The course was southeasterly to northern Texas and thence northeastward over the Lake region and New England. The barometric pressure increased at the centre as it passed eastward from the Pacific coast to the Rocky Mountain region. When central in northern Texas three areas of high pressure were shown on the weather charts, one to the north over Manitoba, one on the north Atlantic coast, and the third on the central Pacific coast. An extended trough of low pressure separated the areas of high pressure and covered the region from the upper lake region southwestward to the Rio Grande Valley, within which this low area was enclosed, bounded by isobars of 29.5, 29.6, and 29.7, which were elliptical in form, the longer axis pointing northeastward, the direction afterwards followed by this storm. This general form of this depression continued during its passage to the Saint Lawrence Valley, with slight changes in pressure, until the centre of disturbance reached the coast, when a decided decrease of pressure occurred, the barometer falling below 29.2 at Eastport, Maine, on the afternoon of the 24th. The telegraphic reports for the succeeding twenty-four hours from the northeastern stations are missing, but severe westerly gales continued in this section on the afternoon of the 25th, thus indicating that this depression passed over the Atlantic, attended by severe storms. The precipitation attending this area of low pressure was more marked in the south and east sections of the country, but light rains or snow were reported in all states and territories, except Dakota, during its passage over the country.

XII.—This area approached from the north Pacific and was observed north of Washington Territory on the afternoon of the 23d. It crossed the continent in two days and sixteen hours, following approximately the path of the preceding storm, however, not passing as far to the south, on the eastern slope of the Rocky Mountains previous to the change of direction to the northeast, but it passed farther to the north while moving over the Lake region. After reaching the Saint Lawrence Valley it passed over New England to the south of Nova Scotia, following the course of the preceding storm, but exhib-

iting much less energy. During the movement of this area of low pressure to the eastward the barometer fell to 29.50 at stations near the centre in Nebraska, after which the pressure rose and again fell to 29.50 when the centre was passing over Lake Huron. From this point eastward to the Atlantic the pressure at the centre increased.

XIII.—This disturbance also passed from the north Pacific coast, where it was central on the 26th, and from the tri-daily weather charts it may be traced to the north of the upper lake region on the 29th. It was at no time central within the limits of the United States, but was attended by severe gales in the Lake region and general rains or snows over the central valleys, Lake region, and Atlantic States when the centre was near Lake Superior, from which region it apparently moved northeastward and did not reach the coast within the limits of observation.

XIV.—This storm apparently developed during the night of the 28th, over Montana. The depression was elongated and located between two high areas, one to the north of Montana and the other on the central Pacific coast, the longer axis pointing to the southeast. It moved rapidly to southern Minnesota during the succeeding eight hours, the general form continuing but the larger axis pointing to the northeast. This rapid movement to the eastward was apparently due to the union of the two high areas previously referred to. It passed eastward over the Lake region to the Saint Lawrence Valley during the 29th and 30th with increasing energy near the centre of disturbance, but without causing any decided change in the atmospheric conditions south of the Lake region and New England. The minimum barometric pressure (29.21) within this low area occurred at Anticosti, Gulf of Saint Lawrence, on the morning of the 31st. The barometric pressure within the central area decreased slowly during its movement eastward from the Rocky Mountains.

NORTH ATLANTIC STORMS DURING JANUARY, 1887.

[Pressure in inches and millimetres; wind-force by Beaufort scale.]

The paths of the depressions that have appeared over the north Atlantic Ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the proprietors of the "New York Maritime Register," and from other miscellaneous data received at this office up to February 22, 1887.

Twelve depressions are traced, of which, seven passed northeastward over, or in the vicinity of, Newfoundland; four first appeared over mid-ocean, and one apparently developed off the east coast of the United States. The general course of direction of the depressions was east-northeast to northeast.

A severe storm prevailed over the British Isles during the 6th and 7th, with barometric pressure ranging below 29.00 (736.6) on the latter date. The disturbance occasioned strong gales between the fortieth and sixtieth parallels and east of the twenty-fifth meridian. This depression was probably a continuation of ocean depression number 2 which occupied the ocean northwest of Scotland on the 5th, after which date its course cannot be accurately determined, owing to an absence of reports.

The depression traced as number 1 first appeared off the southeast coast of Greenland on the 2d and passed east to the north of Scotland. Number 2 passed northeast over the southern portion of Newfoundland during the morning of the 3d and moved rapidly northeast to the north of Scotland by the 5th. Number 3 followed a course similar to that pursued by number 2 during the 7th, 8th, and 9th. Number 4 appeared over the ocean west of Ireland on the 10th and moved to the west coast of Scotland by the 11th. Number 5 passed over Newfoundland during the early morning of the 11th and moved rapidly north-

eastward to the north of Scotland by the 13th. Number 6 passed over the central portion of Newfoundland during the early morning of the 13th and disappeared in the direction of the Scotch coast after the 15th.

Number 7 apparently developed off the coast of the United States and is traced northeast from the 15th to the 18th inclusive, after which it disappeared. Number 8 first appeared over mid-ocean on the 16th, and, moving rapidly northeast to the west coast of Scotland, disappeared after the 17th. Number 9 passed over the northern portion of Newfoundland during the early morning of the 22d and moved ene. until noon (Greenwich mean time) of that date, after which it circled southeast and disappeared in the direction of the Spanish coast after the 24th. Number 10 first appeared over mid-ocean on the 24th, and, passing eastward, disappeared in the direction of the Irish coast after the 25th. Number 11 passed northeast over Newfoundland during the early morning of the 25th and moved rapidly north of east until the 26th, after which it disappeared to the northeastward. Number 12 passed south of Newfoundland during the 27th, and, passing rapidly northeast, disappeared over mid-ocean after the 29th.

The month opened with an area of low pressure central in the vicinity of Cape Cod. This depression passed to the south coast of Newfoundland by the night of the 2d, accompanied by rain and fresh to strong gales north of the thirty-fifth parallel. Over mid-ocean the barometric pressure was high from the thirtieth to the fiftieth parallels, while to the eastward of the twenty-fifth meridian the weather was unsettled. During the first decade of the month the passage of four depressions caused a continuation of unsettled weather over the entire ocean. During this period the pressure continued high in the vicinity of the Azores. During the second decade four depressions appeared, and the pressure within the area of high barometer over the Azores, although subject to frequent fluctuations, continued generally high. On the 16th gales of unusual severity occurred over mid-ocean. The severest storms occurred during the third decade of the month. On the 24th gales of hurricane force prevailed over mid-ocean, and strong gales and generally unsettled weather continued until the 31st. The month closed with relatively fair weather over mid-ocean; over the British Isles and the ocean to the twentieth meridian the pressure was low, with rain and fresh to strong gales; an area of low pressure central over Labrador caused rain and fresh west to south gales over, and in the vicinity of, Newfoundland.

For January, 1886, the paths of seven areas of low pressure were traced, of which, two were continuations of low areas which passed over the United States and Canada; one apparently developed off the coast of Florida; one first appeared over mid-ocean, and the tracks of the remaining three were charted near the west and northwest coasts of the British Isles.

The weather over the north Atlantic during January, 1886, was marked by frequent high winds and gales. The pressure over mid-ocean from the beginning of the month to the 18th was generally high, while successive areas of low pressure took their course along the coasts of the United States and Canada, and also over, and in the vicinity of, the British Isles. From the 19th to the close of the month the pressure over mid-ocean and off the European coast was comparatively low. Areas of high pressure occupied the ocean south of the Banks from the 19th to the 22d and from the 25th to the 28th.

As compared with the corresponding month of previous years the weather over the north Atlantic during January, 1887, was unusually severe over mid-ocean during the latter portion of the month. The storms were more numerous than in previous years, and, being rather equally distributed throughout the month, with tracks, as a rule, confined to territory north of the fiftieth parallel, caused a continuation of strong westerly gales in the trans-Atlantic tracks.

The following are brief descriptions of the depressions traced:

1.—This depression first appeared on the 2d in N. 59°, W. 29°, whence it had apparently advanced from the vicinity of

Greenland; from this position the storm-centre moved east to about N. 60°, W. 12° by the 3d, after which it disappeared in the direction of the Norwegian coast. The depression exhibited barometric pressure ranging below 29.00 (736.6), and occasioned fresh to strong gales east of the twenty-fifth meridian and north of the forty-fifth parallel during the 3d.

The following special reports have been rendered relative to this storm:

Capt. N. Hocken, of the barkentine "Ada Peard," reports: "3d, 1 a. m., in N. 49° 45', W. 9° 0', wind shifted from nne. around by the w. to sw. and increased by noon to a violent gale, with hard squalls and heavy rain; gale continued from this quarter for five hours, when it veered to n. and blew a strong gale for fourteen hours, with hard hail squalls, accompanied with lightning." Capt. Edward Bentley, of the s. s. "Wisconsin," reports a whole gale from the 3d to the 6th; wind veered from s. to nw., with very heavy sea and hard squalls of snow and hail; lowest barometer, 28.95 (735.3), at midnight of the 3d, in N. 50° 0', W. 23° 10'. Captain Santelli, of the s. s. "La Gascogne," reports a strong westerly gale on the 3d and 4th; lowest barometer, 29.57 (751.1), at 8 a. m. of the 3d, in N. 49° 42', W. 20° 15'.

The s. s. "Lake Winnipeg" experienced a westerly storm, commencing on the 2d in the Irish Channel and continuing until the 7th; lowest barometer, 29.00 (736.6), at noon of the 3d, in N. 52° 25', W. 7° 18'. Capt. John Taylor, of the s. s. "Mercia," reports a storm on the 3d from sw. veering to nw.; lowest barometer, 29.26 (743.2), at 5 p. m., in N. 50° 0', W. 5° 56'; gale continued from ssw. to nw. until the 6th, with terrific seas. Capt. G. W. Murray, of the ship "Sapphire," reports: "3d, in N. 49° 45', W. 4° 50', barometer 29.44 (747.8), and falling rapidly; 4.30 p. m., wind sw., force 10, heavy rain, and a fearful sea from wsw.; 7.30 p. m., wind moderating, barometer 29.34 (745.2), sea very heavy; 8.30 p. m., wind n., force 9. 4th, noon, barometer 29.24 (742.7), wind sw. by w., force 9; 6 p. m., barometer 28.94 (735.1), wind hauled to wnw, weather bright and clear to nw. During the 5th and 6th the barometer continued very low in the Channel, with generally moderate, variable winds."

2.—This storm was a continuation of land depression number 1, and, passing northeast over Newfoundland, was central on the 3d in N. 50°, W. 49°, whence it moved northeast to N. 60°, W. 10° by the 5th, accompanied during the 4th and 5th by pressure ranging below 29.00 (736.6), rain, and gales of great violence. Subsequent to the 5th the storm-centre apparently passed southeast over the British Isles, where pressure ranging below 29.00 (736.6) was indicated on the 6th and 7th, and hard gales prevailed over the ocean to N. 40° and W. 20° during these dates.

The following reports, descriptive of disturbances encountered within the area of this depression, have been received:

Capt. H. C. von der Zee, of the s. s. "Zaandam," reports a westerly storm from the 4th to the 7th; lowest barometer, 29.22 (742.2), at 1 p. m. of the 5th, in N. 49° 28', W. 13° 6'. The s. s. "Bolivia" had a whole westerly gale from the 4th to the 6th; lowest barometer, 29.02 (737.1), at noon of the 5th, in N. 54° 35', W. 21° 31'. The s. s. "Samaria" encountered a strong gale on the 5th, in Saint George's Channel; lowest barometer, 28.95 (735.3), at 4 a. m. Capt. H. Schmidt, of the s. s. "Slavonia," reports a storm from the 4th to the 6th; wind veered from wnw. to se. during, and to nw. following, the passage of the depression; lowest barometer at noon of the 5th, in N. 57° 25', W. 13° 8'. Capt. M. Fitt, of the s. s. "Virginian," reports a whole gale from the 4th to the 7th; wind veered from ssw. to nw.; lowest barometer, 29.19 (741.4), at 11.24 a. m. of the 6th, in N. 51° 8', W. 11° 32'. Capt. T. Roberts, of the s. s. "Samaria," reports a severe storm during the 6th, with terrific squalls, hail, and lightning, and a tremendous sea. The gale commenced at 2 a. m. on the 5th, with a sudden shift of wind from ssw. to nw., reaching its height at noon of the 6th, in N. 51° 29', W. 11° 55', when it commenced to moderate. Capt. R. P. Moore, of the s. s. "Siberian," reports a moderate

ne. gale from noon of the 7th to 4 a. m. of the 8th; lowest barometer, 28.92 (734.6), at 8 a. m. of the 7th, in N. 55° 20', W. 10° 20'. The gale was attended by heavy squalls.

3.—This storm was a continuation of depression number iv which circled northeast off the coast of the United States during the 5th and 6th. On the morning of the 7th the storm was central on the south coast of Newfoundland, with pressure about 29.60 (751.8), whence it moved northeast to N. 53°, W. 39° by the 8th, with pressure two to three-tenths of an inch lower than on the preceding date; by the 9th the centre of depression had advanced to N. 57°, W. 21°, with central pressure about 29.20 (741.7), after which it passed northeast beyond the region of observation.

As is shown by the following reports, this depression possessed great energy after passing eastward from the Newfoundland coast:

Capt. W. Gleig, of the s. s. "Kansas," reports a fresh gale from the 8th to the 10th; wind veered from se. to nw.; lowest barometer, 29.31 (744.5), at 8 a. m. of the 8th, in N. 49° 38', W. 36° 0'. Capt. H. Campbell, of the s. s. "Lake Winnipeg," reports a storm from the 8th to the 10th; wind veered from ssw. to wnw.; lowest barometer, 29.48 (748.8), at 8 p. m. of the 8th, in N. 52° 0', W. 29° 0'. Capt. T. Roberts, of the s. s. "Samaria," reports a fresh westerly gale from the 9th to the 11th; lowest barometer, 29.44 (747.8), at midnight of the 9th, in N. 49° 30', W. 29° 0'. The gale was accompanied by high seas and terrific snow squalls. Capt. R. P. Moore, of the s. s. "Siberian," reports a fresh westerly gale from the 9th to the 11th; lowest barometer, 29.28 (743.7), at 4 a. m. of the 9th, in N. 53° 52', W. 26° 0'.

4.—This depression apparently developed to the northwestward of the Azores on the 9th, an absence of reports from that region will not, however, admit of accurately locating its centre on that date. By the 10th the storm had advanced rapidly northeast to N. 53° W. 18° where pressure about 29.00 (736.6) was shown; at 12 noon, Greenwich mean time, of the 11th the storm was central off the west coast of Scotland, whence it passed northeast beyond the region of observation.

The following special reports refer to this storm:

Chief Officer Robert Blythe, of the s. s. "Pontiac," Capt. H. W. Brown, commanding, reports: "9th, in N. 40° W. 39°, strong gale and very high sea commenced from ssw.; wind hauled to unw., then backed to nw.; gale lasted thirty-eight hours, and was obliged to tow oil-bags to prevent sea from breaking on board." Capt. Wm. McMickau, of the s. s. "Umbria," reports a strong gale on the 10th, from sse. veering to nw.; lowest barometer, 29.03 (737.3), at 4 p. m., in N. 51° 10', W. 16° 0'. At noon, with the wind sse. and the barometer falling rapidly, the gale suddenly increased in violence, and a dangerous confused sea was running from s. and w. The ship labored heavily and shipped large quantities of water over all. At Leith, Scotland, on the 11th, the barometer at 6 a. m. stood 29.44 (747.8), at 8.15 a. m. 29.30 (744.2), lowest; wind at 8.15 a. m. sse., force 7½ in squalls, and at 9 a. m. s., 7½ in squalls; at 11 p. m. barometer 29.85 (758.2), rising rapidly.

5.—This storm was a continuation of land depression number vi, and, passing northeast over Newfoundland, was central on the morning of the 11th in N. 51°, W. 48°, with pressure ranging below 29.00 (736.6) and evidence of great energy, whence it moved rapidly northeast to N. 57°, W. 28° on the 12th, with an appreciable increase in central pressure; from this position the storm-centre moved to the north of Scotland by the 13th; thence passing northeast the depression moved beyond the region of observation.

The following reports refer to storms encountered during the passage of this depression:

The s. s. "Rhaetia," Captain Vogelgesang, commanding, experienced a heavy gale on the 10th and 11th; wind veered from se. to n.; lowest barometer, 29.11 (739.4), from 1 a. m. to 4 a. m. of the 11th, in N. 42° 0', W. 62° 51' (at noon). The gale was accompanied by rain and heavy hail and snow squalls, with high cross seas running from the w. and se. The s. s.

"Jeannie" encountered a whole westerly gale on the 10th; lowest barometer, 29.56 (750.8), at 4 a. m., in N. 38° 10', W. 74° 0'. Capt. E. V. Gager, of the s. s. "Louisiana," reports a whole gale on the 10th; wind veered from s. to nw., with heavy rain and high confused sea; lowest barometer, 29.66 (753.4), at 10 a. m., in N. 31° 50', W. 76° 30'. Capt. B. H. Rogers, of the s. s. "Salerno," reports a storm on the 10th; wind veered from se. to wnw.; lowest barometer, 28.88 (733.5), at 10 p. m., in N. 45° 0', W. 51° 25'. The ship "Constance" left Hamburg on December 14, 1886, and had fair weather until January 10, 1887, when in N. 40°, W. 68° a hurricane came up from the nw., accompanied by heavy rain. Suddenly, without warning, the foremast was struck by lightning. It tore the topmast to pieces, broke the yards into kindling wood, and then flying to the mainmast speedily stripped it of rigging. The topmast was smashed to atoms and the mast itself broken off close to the deck but was afterwards braced up. The mizzenmast went overboard in splinters, and there was scarcely a rag of canvas left.

Third Officer D. Thomson, of the s. s. "Richmond Hill," Capt. A. Hyde, commanding, reports a terrific storm, with frequent hail squalls of hurricane force and very high cross sea, on the 11th, in N. 47° 21', W. 44° 35' (at noon); storm at its height at 3 p. m. Capt. H. Parsell, of the s. s. "Adriatic," reports: "11th, a. m., wind backed from nw. to s., increasing, with fierce squalls, to force 11 at noon, with showers of rain and sleet and very heavy sw. sea; p. m., heavy gale, with squalls of hurricane force at short intervals; wind and sea gradually abated after midnight, the wind veering to nw.; lowest barometer 28.96 (735.6); position at noon, N. 48° 14', W. 41° 17'." The s. s. "Siberian" experienced a westerly storm on the 11th and 12th; lowest barometer, 29.02 (737.1), at midnight of the 11th, in N. 50° 32', W. 37° 0'. The s. s. "Bollivia" had a westerly storm during the 11th, with barometric pressure 28.66 (728.0) at 2 p. m., in N. 49° 06', W. 43° 25'.

The s. s. "Leo" experienced a storm during the 11th and 12th; wind veered from s. to wnw.; lowest barometer, 29.39 (746.5), at 10 p. m., in N. 37° 5', W. 58° 0'. Capt. M. R. Thompson, of the s. s. "Horn Head," reports a gale attaining force 11 during the 10th and 11th; wind veered from se. to wnw.; lowest barometer at 6 a. m. of the 11th, in N. 40° 17', W. 53° 0'. "This gale was remarkable for the exceedingly heavy wind that preceded the shift, blowing from 6 to 8 a. m. of the 11th with full hurricane force. During these two hours a dark, compact mass of clouds, giving out brilliant lightning, passed apparently from ssw. to sse., accompanied by torrents of rain. When the clouds had passed the gale broke."

The s. s. "State of Pennsylvania," on the 11th, off the Banks of Newfoundland, in N. 47° 43', W. 45° 0', was struck by a tremendous sea, in the form of a pyramid, which towered above the vessel and came down on the bridge. The skylight of the deck was broken, and tons of water poured into the saloon, where the passengers were at dinner; no one was injured, although considerable damage was done. Previous to encountering the wave the vessel was steering wsw., right in the teeth of the wind, which was blowing fresh. When the sea receded there was a calm for a moment, and then seas rolled in on the vessel, threatening to engulf her. The gale which followed was the worst, Captain Mann states, he has experienced in years. Capt. W. McMickau, of the s. s. "Umbria," reports a whole westerly gale on the 12th; lowest barometer, 29.50 (749.3), at 8 a. m., in N. 48° 35', W. 32° 20'. Capt. G. Mitchell, of the s. s. "Trinacria," reports a strong westerly gale on the 12th; lowest barometer, 29.57 (751.1), at noon, in N. 41° 2', W. 33° 13'.

6.—This storm was a continuation of land depression number vii and passed north of east over Newfoundland during the early morning of the 13th, with central pressure about 29.40 (746.7); on the 14th the storm was central in N. 52°, W. 42°, with slight changes in pressure, whence it moved northeast to N. 55°, W. 26° by the 15th, after which it disappeared in the direction of the Scotch coast.

The following reports refer to this storm:

Capt. R. P. Moore, of the s. s. "Siberian," reports a westerly storm on the 13th and 14th; lowest barometer, 29.79 (756.7), at 4 p. m. of the 13th, in N. 49° 0', W. 41° 0'. The storm was attended by terrific squalls and very high seas, and blew strongest from sw. during the afternoon of the 13th, then veered to nw. and moderated, but increased during the 14th to strong and whole gale, wnw., and moderated at 8 p. m., in N. 47° 0', W. 45° 40'. Capt. W. Whiteway, of the s. s. "Palestine," reports a strong gale on the 14th and 15th; wind veered from ssw. to w.; lowest barometer, 29.50 (749.3), at midnight of the 14th, in N. 50° 30', W. 31° 0'. The gale began at 4 a. m. of the 14th from ssw., force 7; 8 a. m., ssw., force 8; noon, wsw., force 8; 1 p. m., veered to w., force 9, with high seas, heavy squalls, and hail, and continued the same through a. m. of the 15th, moderating at 4 p. m., in N. 50° 0', W. 33° 0'.

7.—This depression apparently developed off the coast of the United States during the early morning of the 15th, whence it circled northeast and disappeared over mid-ocean after the 18th. The storm was of moderate strength throughout, but displayed greatest energy on the 18th.

The following special reports refer to this storm:

The s. s. "Australia," on the 17th, had an unsteady se. and e. breeze in the afternoon, with much rain and threatening sky; by evening the wind had died out and lightning was observed all around the horizon; at 8 p. m., in N. 46° 48', W. 39° 50', the barometer read lowest, 29.00 (736.6), and a gale of hurricane force set in from the ne. and continued for six hours, with much rain, after which it decreased and was followed by strong northerly winds during the 18th. Capt. W. James, of the s. s. "Warwick," reports a whole gale on the 18th and 19th; winds veered from se. to w.; lowest barometer, 29.47 (748.5), at 8 p. m. of the 18th, in N. 51° 8', W. 21° 5'. Second Officer F. Potts, of the s. s. "British Crown," Capt. A. Smith, commanding, reports a fresh sw. to nw. gale on the 18th and 19th; lowest barometer, 29.73 (755.1), at midnight of the 18th, in N. 50° 45', W. 14° 50'. The gale was accompanied by a very heavy cross sea. The barometer rose very rapidly during the 18th to 30.69 (779.5) at midnight.

8.—This depression first appeared over mid-ocean on the 16th, with pressure ranging below 29.00 (736.6); passing rapidly northeast, the storm was central on the 17th west of the northern extremity of Scotland, with a slight rise in central pressure, whence it passed beyond the region of observation. This depression was attended by severe disturbances, the nature of which will be seen by the following special reports:

Capt. W. Skjöldt, of the s. s. "Island," reports a hurricane from se., veering to nw., attaining greatest force on the 16th, on which date, at 11 p. m., the barometer read 28.55 (725.2), when in N. 48° 37', W. 29° 15'. Capt. G. Cochrane, of the s. s. "Helvetia," reports a whole gale on the 16th; wind veered from s. to nw.; lowest barometer, 29.15 (740.4), at 4 p. m., in N. 50° 17', W. 26° 30'. Capt. T. H. Schwaner, of the s. s. "Grasbrook," reports a whole gale from the 14th to the 16th; wind veered from sw. to ene.; lowest barometer, 29.26 (743.2), at 1.30 p. m. of the 16th, in N. 48° 5', W. 34° 48'. Second Officer S. Bakker, of the s. s. "Pennland," Capt. Rud Weyer, commanding, reports a s. to w. storm on the 15th and 16th; lowest barometer, 29.30 (744.2), at 1.30 a. m., in N. 47° 52', W. 37° 33'. The gale was accompanied by tremendous w. and sw. seas and very heavy rain. Capt. G. Franck, of the s. s. "Australia," reports a storm on the 15th and 16th; wind veered from nw. to sw.; lowest barometer, 29.18 (741.2), at 2 p. m. of the 16th, in N. 47° 50', W. 34° 45'. Capt. F. S. Land, of the s. s. "City of Berlin," reports a westerly gale, of force 9, on the 16th; lowest barometer, 29.09 (738.9), in N. 49° 22', W. 35° 0'.

Capt. J. Ueberweg, of the s. s. "Waesland," reports a strong westerly gale from the 14th to the 16th; lowest barometer, 29.30 (744.2), at 4 p. m. of the 16th, in N. 51° 25', W. 21° 57'. Capt. S. Walters, of the s. s. "Iowa," reports a fresh sw. to w. gale on the 16th and 17th; lowest barometer, 29.52 (749.8), at

4 a. m., in N. 50° 32', W. 13° 0'. Capt. John Jenkins, of the s. s. "Ripon City," reports: "16th, strong gale set in, with heavy rain, backing as it increased from s. to se.; 17th, in N. 58° 20', W. 6° 6'; 2 p. m., barometer 28.90 (734.0), wind increased to hurricane force until 3.30 p. m., when it veered to ssw. and continued strong gale, with heavy gusts, under the lee of the island of Lewis.

9.—This storm was a continuation of land depression number x, and, passing over the northern extremity of Newfoundland, moved rapidly northeast to N. 55°, W. 39° by the 22d, after which it circled southeast to N. 51°, W. 19°, by the 24th, whence it moved southeast and disappeared in the direction of the Spanish coast. This storm possessed moderate strength, and exhibited minimum pressure on the 24th.

The following reports refer to this storm:

The s. s. "British Crown" had a fresh gale on the 22d; wind veered from s. by e. to w.; lowest barometer, 29.55 (750.6), at 3 p. m., in N. 47° 40', W. 44° 30'. The gale was of short duration, commencing at 5 a. m. and ending at 6 p. m. The s. s. "Cephalonia" had a moderate gale on the 22d and 23d from s., veering to nnw; lowest barometer, 29.61 (752.1), from midnight of the 22d to 4 a. m. of the 23d, in N. 49° 0', W. 32° 0'. Capt. J. H. Taat, of the s. s. "Edam," reports a n. to w. storm on the 23d and 24th; lowest barometer, 29.02 (737.1), at 4 a. m. of the 23d, in N. 48° 45', W. 40° 23'. The s. s. "British Crown" encountered a strong gale, commencing at 1 a. m. of the 23d, from the w., force 7 to 9, with terrific squalls of wind, hail, and snow; noon, wind nw., force 8; midnight, in N. 48° 10', W. 42° 0', barometer 29.31 (744.5); 24th, barometer rising, with wind wnw., and violent squalls of wind and snow. The gale moderated in the p. m. of the 24th from the nw.

10.—This storm appeared over mid-ocean, in N. 51°, W. 34°, on the 24th and moved eastward to N. 52°, W. 22° by the 25th, after which it disappeared in the direction of the Irish coast. The disturbances accompanying this depression were probably the severest experienced on the north Atlantic during the month, and the depression was remarkable by reason of its apparent sudden development and dissipation.

The following special reports give the general character of the disturbances encountered:

The s. s. "Norwegian," on the 24th and 25th, had a storm, veering from s. to nne.; lowest barometer, 28.76 (730.5), at 8 p. m. of the 24th, in N. 52° 0', W. 28° 0'. Capt. P. J. Irving, of the s. s. "Republic," reports a whole gale on the 24th; wind veered from sse. to w.; lowest barometer, 28.89 (733.8), at 9 a. m., in N. 50° 9', W. 32° 56'. The wind shifted to w., with terrific squalls and tremendous seas. Capt. H. Supmer, of the s. s. "Donau," reports a whole westerly gale on the 23d and 24th; lowest barometer, 28.97 (735.8), at 3 p. m. of the 24th, in N. 47° 20', W. 39° 35'. Capt. F. Watkins, of the s. s. "City of Chicago," reports a strong ssw. to nw. gale on the 24th; lowest barometer, 29.14 (740.1), at 1 a. m., in N. 46° 0', W. 40° 30'.

Third Officer B. C. Lewis, of the s. s. "British Prince," Capt. S. Norvell, commanding, reports: "24th, in N. 48° 29', W. 31° 15', at noon, at 10.20 a. m., Greenwich mean time, the barometer stood at 29.38 (746.2). The pressure had been decreasing steadily since the 21st, and commenced to fall rapidly on the morning of the 24th, with wind sw., force 7; at noon, barometer 29.21 (741.9), wind shifted to wnw.; at 5.24 p. m. wind backed to wsw., force 7; the barometer reached its minimum, 29.00 (736.6), at 7.30 p. m., when the wind shifted suddenly to n. and freshened rapidly to force 10; the sea, which up to this time had been only high from the sw., shifted with the wind and became so heavy that the ship was brought head on. During the evening and night of the 24th the gale reached force 11, with violent squalls and very high sea." Capt. H. M. Frank, of the s. s. "Taormina," reports: "24th, in N. 48° 25', W. 41° 6', at noon; from 3 a. m. to 9 a. m. had a hurricane from sw. to nnw.; lowest barometer, 28.40 (721.3), at 5 a. m. At 8 a. m. saw a water-spout in a ne. direction."

Capt. J. Oseinak, of the s. s. "Bavarian," reports a hurri-

cane on the 24th; lowest barometer, 28.90 (734.0), at 9.40 a. m., in N. 49° 27', W. 34° 12'. The storm began at 8 p. m. of the 23d, in N. 50° 0', W. 31° 0', from wsw., force 8, with violent rain and hail squalls (10 p. m., very bright northern lights); a. m. of the 24th, winds wsw., force 7, heavy rain squalls and high sea; 5 a. m., backed to sw.; 6 a. m., ssw., force 8, misty and lightning; 8 a. m., ssw., force 9; noon, wind veered to nw.; 3.30 p. m., veered to n., force 12, with terrific sea; 4.30 p. m., nne., force 12, fearful hurricane and terrific seas breaking completely over the ship; 7.30 p. m., backed to n., force 11, with hurricane squalls and hail until a. m. of the 25th, when the gale moderated from nw., in N. 47° 18', W. 35° 30'. Capt. J. W. Jones, of the s. s. "Chicago," reports a westerly hurricane on the 24th; lowest barometer, 28.79 (731.3), at 2 p. m., in N. 49° 5', W. 33° 7'. Capt. G. O. Boothby, of the s. s. "Belgravia," reports a strong gale on the 23d and 24th; lowest barometer, 29.16 (740.7), at 3 a. m. of the 24th, in N. 54° 0', W. 23° 0'. The wind backed from sw. to sse., and veered to w. and wnw. Capt. H. M. Frank, of the s. s. "Taormina," reports a nw. to n. hurricane on the 24th; lowest barometer, 28.45 (722.6), at 5 a. m., in N. 48° 25', W. 41° 6'.

Capt. John Jenkins, of the s. s. "Ripon City," reports: "24th, in N. 50° 38', W. 30° 3', at noon, strong increasing gale from se., with rain and heavy sea from sw. and nw.; 5.30 p. m., barometer fell to 28.69 (728.7), wind shifted to wnw., with increasing sea; 7 p. m., heavy lightning in the northwest quarter; 9.30 p. m., wind shifted in a heavy squall to nnw., with hurricane force, accompanied with hail and sleet; on account of heavy cross-sea was obliged to run se. before the storm, which increased until 11 p. m., and backed to nw., with terrific squalls and sea; much oil was used with apparent good effect; sustained damage to boats, etc.; at 12 midnight the barometer was rising and the squalls subsiding; wind continued strong gale until noon of the 25th. The storm was the severest I ever experienced." Captain Luckhurst, of the s. s. "Wetherby," reports a hurricane from 5 a. m. of the 23d to 6 a. m. of the 24th; wind veered from sw. to nne.; force was greatest from n. to nne. from 8 p. m. to midnight of the 23d, in N. 49° 50', W. 33° 0'. The gale was accompanied by squalls of the most terrific description, and mountainous seas and rain at times.

Capt. Sam Brooks, of the s. s. "Arizona," reports: "25th, in N. 50° 46', W. 26° 28' (at noon), in a northerly gale the ship was boarded by a tremendous sea, which killed two seamen and injured eight, and smashed three boats. The entire westward passage, from the 24th to February 1st, was exceptionally stormy." Third Officer W. H. Logan, of the s. s. "Istrian," Capt. T. H. Fox, commanding, reports a fresh nw. to s. gale from the 23d to 25th; lowest barometer, 28.90 (734.0), at 4 a. m. of the 25th, in N. 50° 0', W. 22° 0'. The s. s. "Belgravia" had fresh to strong gales from the 24th to 31st; lowest barometer, 28.75 (730.2), at 1 p. m. of the 25th, in N. 52° 42', W. 28° 38'; wind backed from sw. to s. and veered to n., with force, save at short intervals, above 9 from the 24th to the 31st, and tremendous sea from sw. and w.

Capt. M. de Jouselin, of s. s. "La Bretagne," reports a storm on the 24th and 25th; wind veered from sse. to nnw.; lowest barometer, 28.81 (731.8), at 4 a. m. of the 25th, in N. 49° 27', W. 28° 45'. Third Officer J. H. Mills, of the s. s. "Aurania," Capt. W. H. P. Hains, commanding, reports: "Whole gale from sw., veering to n., on the 25th; lowest barometer at 10 a. m., in N. 49° 47', W. 28° 33'. Capt. Johannes Schade, of the s. s. "Polaria," reports a whole gale on the 24th and 25th; wind commenced ssw., force 8, at 10 a. m. of the 24th; backed to s. at 9 p. m., and attained its greatest force, 10 to 11, from 11 p. m. of the 24th to 4 a. m. of the 25th; afterwards veering to w. and nw.; lowest barometer, 29.27 (743.4), at 4 p. m. of the 25th, in N. 50° 5', W. 17° 58'.

11.—This storm was a continuation of land depression number xi, and, passing northeast over Newfoundland, was central on the morning of the 25th in N. 50°, W. 53°, with pressure ranging below 29.40 (746.7); by the 26th the depression had

moved north of east to N. 52°, W. 33°, with slight changes in central pressure, after which date it disappeared to the north-eastward beyond the region of observation.

The following special reports have been made in connection with this storm:

Capt. P. J. Irving, of the s. s. "Republic," reports a strong gale on the 25th; wind veered from sse. to w.; lowest barometer, 29.13 (739.9), at 9.40 p. m., in N. 47° 46', W. 37° 16'. The weather continued boisterous until the 29th, with wind ranging between s. and nne., with heavy sea and terrific squalls, the ship being continually flooded fore and aft; intensely cold just westward of the Banks. Capt. M. Garson, of the s. s. "Madrid," reports: "25th, in N. 37° 40', W. 54° 22', at noon, had s. to w. storm, attaining force 11. Before the gale commenced the upper clouds, cirro-cumulus, were moving from wnw., true, and the lower clouds from s.; just before the shift the wind blew in gusts of force 10 to 11, with very heavy rain. When the rain ceased the wind veered to w., force 7, and rapidly moderated to force 5; lowest barometer, 29.85 (758.2), at about 10 a. m.

The s. s. "British Crown" had a strong sw. to w. gale on the 25th and 26th; lowest barometer, 29.00 (736.6), at 3 p. m. of the 25th, in N. 46° 8', W. 49° 30'. The gale was accompanied by terrific squalls and very high seas, with shifts of wind to the northwestward. Capt. P. Urquhart, of the s. s. "Lord Olive," reports a whole sw. to w. gale on the 25th; lowest barometer, 29.20 (741.7), at 1 a. m., in N. 41° 36', W. 64° 45'. During the gale the sea was very high from the sw., and wsw., and continued strong after the gale was over. Capt. W. Stewart, of the s. s. "Lake Superior," reports a hurricane from the 25th to the 27th; wind veered from s. to nw.; lowest barometer, 29.34 (745.2), at 8 a. m. of the 26th, in N. 50° 38', W. 34° 0'. The s. s. "La Bretagne" encountered a whole s. to wnw. gale on the 26th; lowest barometer, 29.28 (743.7), at 3 a. m., in N. 47° 45', W. 36° 0'.

12.—This storm was a continuation of land depression number xii and was central off the south coast of Newfoundland on the morning of the 27th, with central pressure about 29.60 (751.8), whence it passed northeast to N. 52°, W. 37° by the 28th, with pressure about three-tenths lower than on the preceding day; from this position the storm-centre advanced to N. 54°, W. 24° on the 29th, with an appreciable loss of energy, after which it passed northeast beyond the region of observation.

The following are the reports of shipmasters' relative to storms encountered during the passage of this depression:

The s. s. "British Crown" experienced a fresh gale on the 27th; wind backed from ne. to nnw., lowest barometer, 29.57 (725.7), at 6 a. m., in N. 45° 22', W. 57° 5'. Capt. M. Parry, of the s. s. "Pnydian," reports a fresh gale from sse, veering to w., n., and nne. on the 27th; lowest barometer at 3.30 p. m. of the 27th, in N. 35° 10' W. 58° 57'. Capt. J. W. Janes, of the s. s. "Chicago," reports a westerly hurricane from the 26th to 28th; lowest barometer, 29.57 (751.1), at 4 a. m. of the 28th, in 46° 35', W. 39° 15'. The s. s. "Bavarian" encountered a south to west hurricane, which attained greatest force on the 28th, in N. 46° 42', W. 41° 28', when barometer read 29.76 (755.9) at 9 a. m. Capt. C. Hebich, of the s. s. "Wieland," reports a whole westerly gale from the 27th to 29th; lowest barometer, 29.70 (754.4), at 4 a. m. of the 29th, in N. 49° 42', W. 24° 16'.

OCEAN ICE.

The only ice reported during the month was a medium sized berg observed from the s. s. "Wetherby" on the 30th, at 6.15 p. m., in N. 48° 30', W. 46° 0'.

In January, 1886, several icebergs were reported off the the southeast coast of Newfoundland.

In January, 1885, icebergs were reported between W. 45° 30' and W. 42° 24', none being observed south of the forty-seventh parallel. In this month they were observed eleven days earlier and were about four degrees further eastward than those of January, 1884.

In January, 1883, the first icebergs reported were observed in N. 47° 35', W. 45° 04' on the 30th; in 1882 the first icebergs were seen in N. 47° 30', W. 48° 35' on the 30th.

From the above, it will be seen that the ocean ice observed during January, 1887, was somewhat less, in quantity, than the average for corresponding months of the five preceding years. The iceberg reported was, however, in the same locality as those first observed in the preceding years, and serves to indicate a seasonable southern movement of icebergs and field-ice from the Labrador coast.

FOG.

The following shows the limits of fog-areas encountered on the north Atlantic Ocean during January, 1887, as reported by shipmasters:

1st.—The s. s. "British Queen," in N. 44° 6', W. 64° 0', had fog from 3.26 p. m. until midnight, with southerly winds and pressure below the normal. The s. s. "Palmyra," in N. 42° 50', W. 62° 20', had dense fog from 11 a. m. to 1.30 p. m., and again at midnight and until noon of the 2d, in N. 42° 33', W. 67° 55', with southeast veering to southwest winds and falling barometer. The s. s. "Prussian," in N. 44° 14', W. 53° 52', had fog, at intervals, from 1 p. m. until 2 a. m. of the 2d, in N. 43° 0', W. 58° 0', with moderate southwest winds and falling barometer.

7th.—The s. s. "Paxo," in N. 46° 18', W. 48° 8', had dense fog from 8 a. m. to noon, with fresh se. breeze and pressure below the normal.

15th.—The s. s. "Siberian," in N. 46° 0', W. 48° 10', had dense fog from 4 to 11 p. m., with southerly winds and falling barometer.

23d.—The s. s. "Borderer," in N. 44° 10', W. 63° 10', had dense fog from 7 a. m. to 3.30 p. m., with moderate wsw. breeze and pressure about normal.

As in the two preceding months, fog was encountered with southerly winds and barometric pressure below the normal, or to the eastward of areas of low pressure.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for January, 1887, is exhibited on chart ii by the dotted isothermal lines; and in the table of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service. On chart iv the departures from the normal are illustrated by lines connecting stations of normal or equal abnormal values.

During January, 1887, the temperature of the air has been above the normal on the Pacific slope and in the plateau regions and eastern slope of the Rocky mountains, except in eastern Montana. It has been normal or slightly above along the Atlantic coast from Eastport, Maine, to Hatteras, North Carolina. The departures in excess of the normal are small, except in the Rocky Mountain regions where they range from 4° 5 at Prescott, Arizona, to 8° 6 at Spokane Falls, Washington Territory. In Dakota, Minnesota, eastern Montana, the Missouri Valley, upper Mississippi valley, the Lake region, Saint Lawrence Valley, New England, the Ohio Valley, and the Southern States the temperature of the month has been below the normal. The deficiencies are especially large in Dakota, Minnesota, and the upper lake region, where the mean temperature of the month is about 7° 0 below the normal. In the south Atlantic and east Gulf states it is 2° 5 below the normal.

The following are some of the most marked departures from the normal temperature at Signal Service stations:

Above normal.		Below normal.	
Spokane Falls, Washington Territory...	8.6	Saint Paul, Minnesota.....	11.4
Las Animas, Colorado.....	8.1	Bismarck, Dakota.....	11.1
Boise City, Idaho.....	7.8	Fort Buford, Dakota.....	8.3
Fort Thomas, Arizona.....	7.4	Duluth, Minnesota.....	8.3
Helena, Montana.....	5.4	Marquette, Michigan.....	8.3
Winnemucca, Nevada.....	5.0	Omaha, Nebraska.....	7.8
Salt Lake City, Utah.....	4.6	Davenport, Iowa.....	7.7
Prescott, Arizona.....	4.5	Dubuque, Iowa.....	7.5

DEVIATIONS FROM NORMAL TEMPERATURES.

In the table below are given, for certain stations, as reported by voluntary observers, the normal temperatures of January for a series of years, the mean temperature for January, 1887, and the departures from the normal:

Station.	County.	Normal temperature for January.	Number of years.	Mean temperature for Jan., 1887.	Departure.
Arkansas.		0		0	0
Lead Hill.....	Boone.....	29.3	5	34.3	+ 5.0
California.					
Sacramento.....	Sacramento.....	46.5	21	44.3	- 2.2
Connecticut.					
Middletown.....	Middlesex.....	24.8	29	22.7	- 2.1
New Haven.....	New Haven.....	26.6	101	25.2	- 1.4
Thompson.....	Windham.....	21.4	30	21.8	+ 0.4
Dakota.					
Webster.....	Day.....	1.3	4	- 12.6	- 13.9
Illinois.					
Collinsville.....	Madison.....	25.1	8	23.9	- 1.2
Mattoon.....	Coles.....	24.8	7	24.0	- 0.8
Peoria.....	Peoria.....	24.1	31	21.0	- 3.1
Riley.....	McHenry.....	17.5	23	11.1	- 6.4
Sycamore.....	De Kalb.....	14.3	6	12.5	- 1.8
Indiana.					
Lafayette.....	Tippecanoe.....	22.8	8	20.1	- 2.7
Logansport.....	Cass.....	25.2	33	22.4	- 2.8
Vevay.....	Switzerland.....	31.4	21	30.3	- 1.1
Iowa.					
Creco.....	Howard.....	10.1	15	3.0	- 7.1
Monticello.....	Jones.....	14.8	37	8.9	- 5.9
Muscatine.....	Muscatine.....	18.7	49	12.5	- 6.2
Kansas.					
Independence.....	Montgomery.....	27.8	16	27.1	- 0.7
Wellington.....	Sumner.....	24.2	9	26.7	+ 2.5
Maine.					
Belfast.....	Waldo.....	19.0	28	17.5	- 1.5
Gardiner.....	Kennebec.....	17.8	51	15.8	- 2.0
Orono.....	Penobscot.....	15.4	19	14.0	- 1.4
Maryland.					
Cumberland.....	Alleghany.....	30.8	15	28.6	- 2.2
Fallston.....	Harford.....	29.7	16	28.6	- 1.1
Massachusetts.					
Amherst.....	Hampshire.....	22.3	50	19.4	- 2.9
Cambridge.....	Middlesex.....	24.9	65	22.8	- 2.1
Fitchburg.....	Worcester.....	22.3	30	20.4	- 1.9
New Bedford.....	Bristol.....	28.3	75	26.7	- 1.6
Somerset.....	Bristol.....	26.2	17	26.5	+ 0.3
Springfield.....	Hampden.....	24.4	20	22.2	- 2.2
Taunton.....	Bristol.....	26.1	16	26.1	0.0
Williamstown.....	Berkshire.....	21.5	33	20.0	- 1.5
Michigan.					
Thornville.....	Lapeer.....	23.2	12	19.2	- 4.0
Nevada.					
Carson City.....	Ormsby.....	32.7	8	36.5	+ 3.8
New Brunswick.					
Saint John.....	Saint John.....	18.0	27	17.6	- 0.4
New Hampshire.					
Concord.....	Merrimac.....	21.5	19	19.2	- 2.3
Hanover.....	Grafton.....	16.1	24	13.0	- 3.1
New Jersey.					
South Orange.....	Essex.....	28.2	17	28.7	+ 0.5
New York.					
North Volney.....	Oswego.....	21.9	19	19.0	- 2.9
Palermo.....	Oswego.....	20.3	34	17.0	- 3.3
Ohio.					
Wauseon.....	Fulton.....	22.7	17	19.3	- 3.4
Pennsylvania.					
Dyberry.....	Wayne.....	20.9	23	19.8	- 1.1
Grampian Hills.....	Clearfield.....	21.5	17	21.1	- 0.4
South Carolina.					
Stateburg.....	Sumter.....	43.8	6	42.4	- 1.4
Texas.					
New Utm.....	Austin.....	50.3	14	49.6	- 0.7
Vermont.					
Lunenburg.....	Essex.....	15.1	39	13.3	- 1.8
Newport.....	Orleans.....	14.4	12	11.3	- 3.1
Stratford.....	Orange.....	15.8	12	13.3	- 2.5
Virginia.					
Dale Enterprise.....	Rockingham.....	28.7	7	33.6	+ 4.9
Variety Mills.....	Nelson.....	34.1	10	32.9	- 1.2
West Virginia.					
Helvetia.....	Randolph.....	32.3	11	31.0	- 1.3
Parkersburg.....	Wood.....	35.5	8	31.0	- 4.5

* From the "Bulletin of the New England Meteorological Society."

The following notes on temperature are furnished by voluntary observers:

Dakota.—Webster, Day county: during the month the temperature has been below zero every day except the 15th; the daily mean has been below zero on twenty-four days.

Illinois.—Mattoon, Coles county: the highest temperature that has occurred in any January during the past seven years was 65° 0, in 1880; the lowest, -28° 0, in 1884; the highest mean temperature, 40° 0, occurred in 1880; the lowest mean, 19° 0, in 1881.

Riley, McHenry county: during the past twenty-three years the highest January mean temperature, 33° 4, occurred in 1875; the lowest mean, 5° 9, in 1880.

Indiana.—Vevay, Switzerland county: during the past twenty-one years the highest January temperature, 69° 0, occurred in 1866 and 1876; the lowest, -28° 0, in 1884.